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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.                | CONFIRMATION NO.       |
|---|-------------|----------------------|------------------------------------|------------------------|
| 10/564,737  | 01/19/2006  | Albrecht Maurer      | 05166                              | 5263                   |
| 23338 7590 09/10/2008<br>DENNISON, SCHULTZ & MACDONALD<br>1727 KING STREET<br>SUITE 105<br>ALEXANDRIA, VA 22314 |             |                      | EXAMINER<br>SAINT SURIN, JACQUES M |                        |
|   |             |                      | ART UNIT<br>2856                   | PAPER NUMBER           |
|   |             |                      | MAIL DATE<br>09/10/2008            | DELIVERY MODE<br>PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

## Application No.

10/564,737

## Applicant(s)

MAURER ET AL.

## Examiner

J M. SAINT SURIN

## Art Unit

2856

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2006 and 19 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-15 is/are allowed.
- 6) ☒ Claim(s) 1-8 and 16-22 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01/19/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 04/06
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. The preliminary amendment of 01/19/06 is acknowledged, considered and entered.

***Drawings***

2. The drawings filed on 01/19/06 are accepted by the Examiner.

***Claim Objections***

3. Claims 4-5 are objected to because of the following informalities: There is no antecedent basis for "interference pattern" recited in claim 5. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 16 and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dory (US Patent 6,023,660) in view of Fairley et al. (US Patent 5,019,786).

Regarding claims 1 and 16, Dory discloses a method for processing signals which are generated during the non-destructive examination of objects, e.g. pipes or sheet metal, by reflection of ultrasonic waves at defect locations of the structure of the object (see abstract and col. 7, lines 25-27), comprising the steps of:

emission of a complete wave front onto at least one section of the object to be examined by means of a plurality of independent transmitter elements (D1 to D9), (see abstract and col. 3, lines 44-46, col. 7, lines 28-29)

reception of a wave reflected by the structure of the object by means of a plurality of receiver elements (D1 to Dn) [col. 3, line 45] which are independent of one another, (see abstract and col. 3, lines 45, 61-62, col. 7, lines 29-31);

digitalizing the signals received from the receiver elements (D1-D9), (see col. 3, lines 50-51, col. 4, lines 1-2 and col. 5, lines 60-62);

storage of the digitalized signals (col. 6, lines 6-10 and col. 7, lines 33-34).

Although Dory discloses these data can also be processed, e.g. by logic circuits enabling identification and recording of the type of faults detected in the case of nondestructive monitoring, it does not particularly disclose the defect locations are detected by a phase-locked addition of the stored amplitude values along a propagation time. Fairley discloses a phase-locked loop 10 at the summing unit 34 which summed the amplitude of the voltage of the square wave dithering signal (col. 5,

lines 33-37). The summing circuit 60 sums the output from resistor 56 with output from a phase detector (multiplier) 70 in the phase-locked loop 52. It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Dory the phase locked loop of Fairley because it would include a dithering signal to the clock signal in the measuring device to change the time at which the phases of the two measured signals are compared and then averages the results over a period of the dithering signal to obtain the phase difference wherein the amplitude of the integrated dithering signal graph indicates the phase shift of the undithered clock signal.

Therefore, one of the ordinary skill in the art utilizing the above combination would have known that by taking the phase difference between these signals with the phase-locked loop, the position or location of the defects would be effectively detected in a reliable manner.

Regarding claim 16, it is similar in scope with claim 1 and therefore, it is rejected for the reasons set forth for that claim.

Regarding claims 19-22, Dory discloses the probe is characterized as a phased array transducer (probe 1, col. 3, lines 43-45). Dory further discloses transmitting at least one incident wave in said structure, receiving waves reflected or transmitted by a position of said structure encountered by said incident wave inside said object, by a plurality of detection elements, independent from each other (col. 7, lines 28-34).

7. Claims 2-6 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dory (US Patent 6,023,660) in view of Thornell (US Patent 4,342,063) and further in view of Schmitz (DE3236017).

Regarding claims 2-6 and 17-18, Dory in view of Thornell does not disclose identifying a defect location on an outer surface of the object facing the probe (1), the point-wave signals passing from the defect location are evaluated and the detection of the defect location (AF) on the outer surface of the object (12, 24), i.e. the surface facing the probe (14, 26, 28), is effected by an addition of those amplitude values stored in the storage module (SP) which are derived from the point-wave signals proceeding from the outer defect (AF). Schmitz discloses an all-round scanning a material defect by means of a switched array with high-frequency signal processing to detect defects in materials by means of ultrasound, in which method a) an array test head is switched in different positions, b) the transit time is measured, c) allowing for the specific sound velocity, d) the amplitudes of the signals are measured and e) the intensity is determined from said signals and the intensity distribution is displayed, for example, on a display screen, this method makes it possible to describe the edges of voluminous or crack-type defects (see abstract). It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Dory in view of Thorney the techniques of Schmitz because it would provide a switched array with high-frequency signal processing to detect defects in materials by means of ultrasound by using all around techniques to reliably detect the outer defects in a reliable manner.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dory (US Patent 6,023,660) in view of Thornell (US Patent 4,342,063) and further in view of Phelan (US Patent 5,060,205).

Regarding claim 7, Dory in view of Thornell does not disclose a propagation time

dependent amplitude correction of the sum signal determined during the addition is performed to identify the location of the defect. Phelan discloses a preferred signal processing method in which echo amplitude values are corrected for attenuation with distance by a time dependent gain factor which increases as a function of time from the transmit pulse (col. 3, lines 34-38). It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Dory in view of Thornell the techniques of Phelan because these values are used to prevent multiple echoes (which occur after the multiple echo time with less than a certain amplitude) from being used in the determination of the distance value. Therefore, one of the ordinary skill in the art using the above combination would be motivated to recognize that the above teachings could be used to determine the location of defects in a well known manner.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dory (US Patent 6,023,660) in view of Thornell (US Patent 4,342,063) and further in view of Benedetto et al. (US Patent 5, 388,182).

Regarding claim 8, Dory in view of Thornell does not disclose the received signals are filtered, preferably wavelet filtered, after their digitalization for the data reduction. Benedetto discloses the filter bank can comprise a plurality of VLSI's which operate on a digitized or inherently digital incoming signal and perform the filter function digitally, if the desired output is digital, the elements comprising the filter bank can be entirely digital (col. 12, lines 61-67). Benedetto further discloses a wavelet filter bank (col. 17, line 14). It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Dory in view of Thornell the techniques of

Phelan because data compression is obtained by truncation of a discrete representation and reconstruction relies on the theory of frames and produces a reconstruction method and apparatus based on irregular sampling methods which produces good quality results in a very few stages wherein actual reconstructions show very good data compression and noise reduction performance to make the above combination more effective.

***Allowable Subject Matter***

10. Claims 10-15 are allowable over the prior art of record.
11. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not disclose or suggest "the independent transmitter elements (EL1-ELN) are controlled in a time-delayed manner in such a way that the emanating wave front extends parallel or approximately parallel to the contour of the surface of the object and the waves reflected by the object are received in a time-delayed manner and generate a substantially planar interference pattern" as recited in claim 10.
12. Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to J M. SAINT SURIN whose telephone number is



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(571)272-2206. The examiner can normally be reached on Mondays to Fridays between 9:30 A.M and 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron L. Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacques M SAINT SURIN/  
Examiner, Art Unit 2856  
September 02, 2008